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SHELTER at home



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Introduction

Not everyone wants to leave home for shelter. Some people can't. Lots of people just prefer to remain in their own house anyway. This inclination is a natural one. It is a sound instinct too, if some protection can be found against the collapse of walls and ceilings.

Shelter indoors allows you to sleep at night in reasonable security and in the warmth and comfort of your house. It also provides handy cover should there be a sudden raid in the day time.

A direct hit cannot be guarded against in any form of home shelter, but the risk of such a direct hit is very small compared with that of a bomb bursting near enough to damage the house or to demolish it. Protection can be obtained in a house even if a bomb demolishes most of it.

The walls, floors and roof of an ordinary house give quite a lot of protection against splinters and blast from a bomb. The idea of an indoor shelter is to make use of this protection and to add safeguards against the other effects of bombs.

The chief of these is the danger of the house falling down. People have often been rescued unhurt from the ruins of demolished houses because they had taken shelter under staircases, or tables, that had by chance been strong enough to protect them from the falling ruins of the house. The chief purpose of the indoor shelters described in this pamphlet is to protect the occupants against injury when the bedroom floor, the roof and other débris fall on them.

They do not provide such easy emergency escape as a garden shelter, but if you are trapped they protect you from the débris till the Rescue Party releases you. Very often, however, though the house has fallen you will be able to release yourself and walk out.

The indoor shelters with which this pamphlet deals are unsuitable for houses with more than two storeys above the shelter room. They are intended chiefly for use in ordinary two-storey houses, but have a margin of strength that will take the weight of an extra storey.

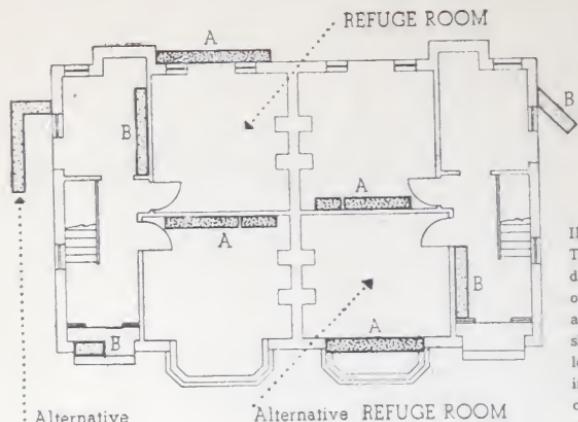


ILLUSTRATION NO. 1.

This shows how in a typical semi-detached suburban house the living room or dining room can be protected to form a refuge room. The outside barricades should be at least as high as window sill level, but can be up to 6 ft. high as shown in Illustration No. 6. The inside barricades can be built up with heavy furniture or bookcases packed with books.

Barricades : A. First importance. B. Secondary importance.

How to arrange "SHELTER at home"

First you should choose a refuge room in your house where the shelter can be placed. Both the choice of room and position of the shelter in it are important. You may also have to barricade the window opening against bomb splinters, and to protect the glass, so that it cannot fly in dangerous splinters. These points are discussed in detail below. It will not always be possible to get an ideal arrangement, but most of the points can be met in the average house. On Pages 4 and 5 are plans of typical houses showing the best rooms for refuge, and how to improve their natural protection.

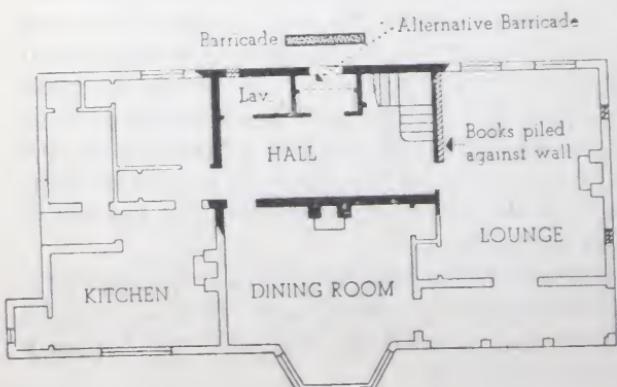


ILLUSTRATION NO. 2.

The hall used as a refuge room. The front door has to be protected by a barricade either outside or in the lobby. The lavatory window is high and may be blocked, but if left open would not constitute a danger to people sitting down in the hall. The two lounge windows facing the hall door should be blocked if the window sills are low.

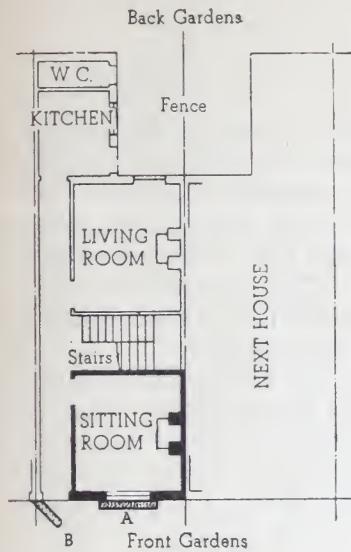


ILLUSTRATION NO. 3.

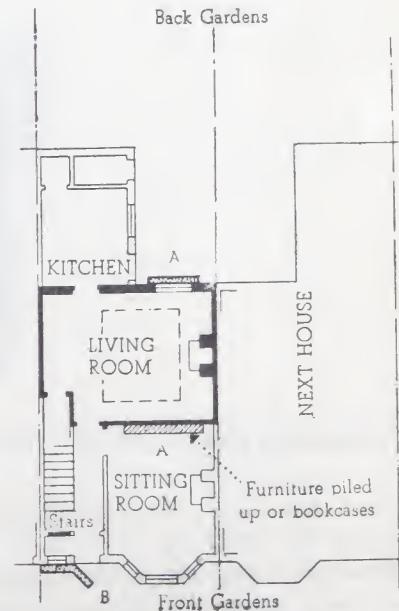
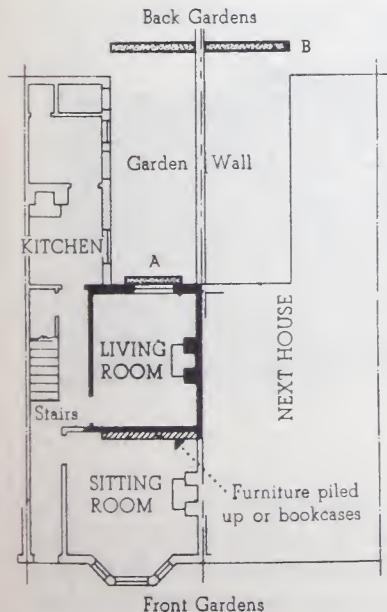
ILLUSTRATION NO. 3. The front sitting room used as a refuge. Barricade A is necessary ; barricade B is desirable.

ILLUSTRATION NO. 4. A living room used as a refuge. Barricades A and B are alternatives ; B costs more but lets in light and air.

ILLUSTRATION NO. 5. A living room used as a refuge. An indoor shelter is best placed inside the dotted line area. Barricades A are necessary ; barricade B is desirable.

ILLUSTRATION NO. 4.

ILLUSTRATION NO. 5.



Choosing a refuge room

The indoor shelters described in this pamphlet are meant for use only in a ground floor or basement room. They must never be placed on the first or higher floors or in a ground floor room having a basement underneath. In houses having a basement under only part of the ground floor, it is generally better not to use the basement, but to select a refuge room in that part of the ground floor that has no basement underneath. This is because the extra protection given by a basement against bomb splinters is more than offset by the greater risk of the occupants being trapped in the basement.

A room having a solid floor, that is to say one of concrete or stone flags, or tiles on concrete, is generally better than one of boards and joists. Also, if possible, choose a room having a fairly high window sill and no door that opens into the garden or street. A room facing the garden is better than one facing the street, because the soft earth may allow the bomb to go in deep before exploding, thus reducing the danger from bomb splinters.

ILLUSTRATION NO. 8.

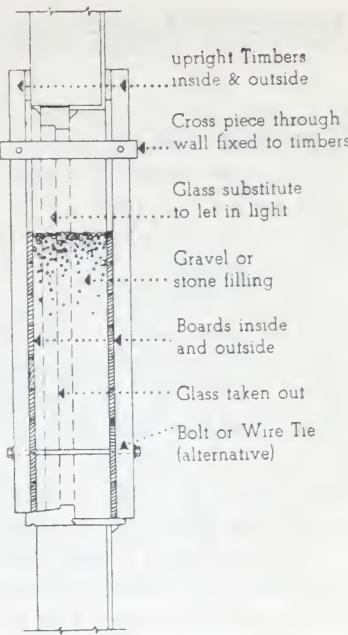
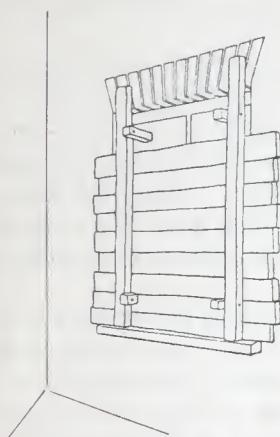
A 6 ft. high barricade built of brickwork, covering the french window of a refuge room. A ventilation gap between the tops of the barricade and the window openings has been fitted with 2 in. thick sloping wooden shutters. These have been fixed securely to the outside so that they cannot be blown into the room by blast.



Protecting the window opening

If the window sill is lower than the top of the shelter there is danger to persons in the shelter from bomb splinters which often fly horizontally. Where this is so, the window opening should be barricaded with a brick, concrete or earth wall, at least as high as the top level of the shelter, or better.

ILLUSTRATION NO. 7. The window is protected by planking and timbers fixed inside and outside, the space between being filled with gravel or broken stone. The two sets of planks and timber must each overlap the window and be strongly fixed to each other with cross timbers, bolts and nuts, or tie wires.



SECTION THROUGH THE WALL

up to 6 ft. above floor level. Any outside doors or French windows should be barricaded in the same way. A brick wall $13\frac{1}{2}$ in. built in cement mortar (one and a half bricks) thick gives excellent protection, but one 9 in. (single brick) thick is quite good. Earth about 2 ft. 6 in. thick, or gravel about 2 ft. thick, held between boards framed together, or in sandbags, gives as good protection as a $13\frac{1}{2}$ in. brick wall. The protection can either be a barricade built outside the window, or be fixed in the window opening.

ILLUSTRATION NO. 6 shows a barricade of brickwork. Hollow concrete blocks, filled with earth or sand, can be used in the same way; the total thickness of these should be not less than 18 in. Barricades placed against walls, especially if they are of earth, may cause the wall of the house to become damp. To prevent this place a layer of building paper between the barricade and the wall, and fasten another layer down over the top. Barricades of brickwork or concrete blocks can be protected on top against rain by a layer of slates or tiles set in cement mortar.

If the protection is fixed in the window opening it must be securely fastened to the walls. For example, if a window is bricked up, the new brickwork must be joined in with the old. On no account should bricks or sandbags be simply piled on the window sill, because blast may throw them violently into the room. A good method is to fasten thick boards across the window opening, both inside and outside, the space being filled with gravel or broken brick or stone (ILLUSTRATION NO. 7). It will usually be best to take out the window, or at least the glass, before doing this.

Treatment of window glass

It is much the best to have no glass in the window of the refuge room. If you want some daylight to come in, you can remove the glass and use a flexible glass substitute instead. Many kinds are now sold in shops. Otherwise, a glass substitute can be home-made of a double thickness of cheese cloth or muslin fastened over the window frame and coated with ordinary size and varnish.

Some of the thicker and more expensive glass substitutes can be fixed with putty like glass, and they can then be put back if blown out ; the thinner and more flexible kinds of glass substitute can be wrapped round laths or battens lightly nailed to the window frame. With steel windows, the glass substitute can be fixed to a light wooden frame, made to fit the window and held to it by loops of twisted wire. If a window pane is more than about 2 sq. ft. in area, divide up the opening with wooden battens, otherwise the glass substitute may flap in the wind and tear away.

If you prefer not to take out the glass you *must* treat it to prevent it flying into the room. There are various ways of doing this. One is to fix securely a screen of $\frac{1}{2}$ in. mesh wire netting over the whole of the window on the inside. Small mesh wire netting is, however, difficult to get, and if you have not already got some, you may be unable to do so. Wire netting of bigger mesh than $\frac{1}{2}$ in. should not be used.

A second method, just as good, and usable by anybody, is to paste a suitable covering over the glass inside. The best of these are :

- a Any light-coloured cloth, such as cheese cloth, stuck all over the glass inside with paperhanger's paste or flour paste. The latter can be made as follows :—

Two tablespoonfuls of flour mixed to a paste with three tablespoonfuls of water, plus a piece of washing soda as big as a large almond ; add half a pint of boiling water, stir briskly and heat like porridge for ten or fifteen minutes. Add also $\frac{1}{4}$ oz. borax to 1 pint of the paste to prevent mildew.

- b A textile netting, such as curtain net, stuck on with paperhanger's paste. Many inexpensive nettings are now sold specially for glass protection. Most of them have a dry adhesive incorporated in them and only need damping and pressing over the window.

Another way of fixing netting is to coat the glass with varnish, wait until the latter is "tacky," and then press the cloth, or curtain net, into it, finishing off with a second coat of varnish when the first is dry.

- c Transparent wrapping films, similar to those used in pre-war days to wrap cigarette packets, chocolate boxes, etc., but of a special thickness known as "600." Some are sold ready to stick on the window.

d Strips of sticky cloth tape, many of which are specially sold for window protection. The strips should be criss-crossed on the window, so that no space of clear glass is wider than 4 in. each way. Strip treatments are not so good as the other methods unless they cover the whole surface of the pane. Strips of ordinary paper give hardly any protection. So-called anti-splinter lacquers or varnishes for painting on glass have mostly only a limited life, and may have to be renewed after about two or three months. Some may become useless without showing it.

When putting on treatments, cut the materials large enough to allow them to be stuck in one piece, if possible, over the window frame and glazing bars, if any, as well as the glass and to allow for shrinkage. Sticking them over the frame helps to hold broken panes of glass in place.

All these treatments will stay on the glass better and are not so liable to become mildewed if they are coated with varnish. Use an oil varnish, not a spirit varnish nor cellulose lacquer. The treatments may be varnished only round the edges, but it is better to varnish them all over.

Mildew may form on the netting or curtains which you have pasted on glass if you have not used borax, and will weaken it if left too long. To cure this, brush over the netting a mixture of one ounce of borax dissolved in a quart of water, dusting off the mildew first. Do not make the netting too wet or it may be loosened.

You should realise that you cannot prevent the glass breaking. Nothing stuck on to it will at all increase its chance of remaining unbroken when a bomb bursts nearby. But a good covering, properly stuck on, will prevent the glass flying into the refuge room in small dangerous pieces. Look at your window protection from time to time to see if it is remaining stuck to the glass and to the window frame. Keep it in good condition.

Leaded glazing is less liable to fly dangerously than ordinary sheet glass, but it should be protected in the same way as other forms of glazing.

Glass even behind a barricade is apt to fly about and should be protected in the same way as that of windows not protected by a barricade.

Completing the refuge room

The door of the refuge room may be torn off by blast if it is fastened shut when a bomb explodes. You can either take the door off and use a curtain instead, or you can fasten the door open, when raiding begins, preferably with strong elastic attached to the handle.

Take out of the room all unnecessary things, particularly glass and china ornaments, pictures, mirrors, heavy lighting fittings, etc.—such objects can be thrown about violently by blast.

If possible, move the heavier pieces of furniture out of the room immediately over the refuge room ; this reduces the weight that may fall with the bedroom floor on the shelter.

TYPES OF INDOOR SHELTER

Having chosen and prepared your refuge room, the next question is what sort of a shelter you will put in it. Three alternatives are dealt with in this pamphlet :

1. The Government steel indoor shelter
2. A commercially made shelter
3. A home-made timber-framed structure which the technical services of the Ministry of Home Security have designed.

Government shelters

The Government are distributing free to eligible householders an indoor shelter made of steel. It will also be on sale to householders not eligible for free shelter. These shelters, whether free or on sale, will be distributed first in the more exposed areas. Public announcement is made in each area when the local council is ready to receive applications for shelters.

The model at present being issued consists of a strong frame, a flat top, a spring mattress forming a floor, and sides of open mesh.

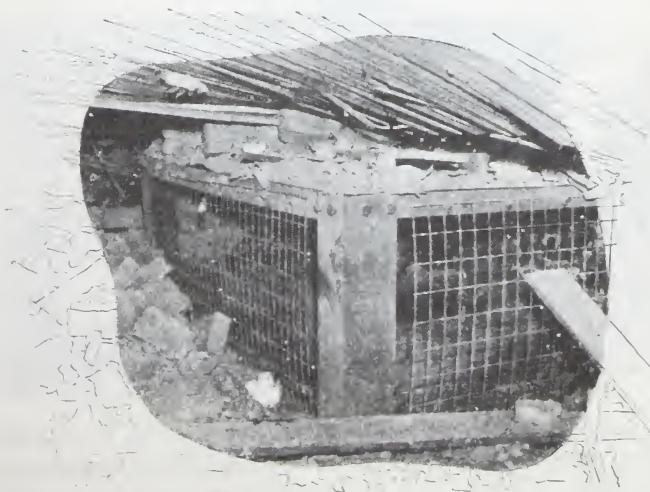
The top of the shelter is sheet steel, and the shelter can be used as a table. The mattress is attached to the frame, so that should the shelter be moved when struck by débris, the occupants will be carried with it. The fact that the shelter can move a little helps it to resist the weights falling on it. The four steel mesh sides are so made that they resist blows from débris, such as loose bricks from a demolished wall, but they can all easily be opened from inside. This "table" shelter has been thoroughly tested.

The shelter will be supplied in sections and you must put it together yourself. This does not require any special skill or strength. A leaflet of simple instructions, and the necessary tools, will be supplied with the shelter.



ILLUSTRATION NO. 8.

The house in the upper photograph had a Government steel shelter in a downstairs room and was blown up to reproduce the effect of a heavy bomb falling near. The whole house collapsed, burying the shelter under débris. In the lower photo the shelter can be seen still intact. It would have been possible for anyone in the shelter to get out unaided.



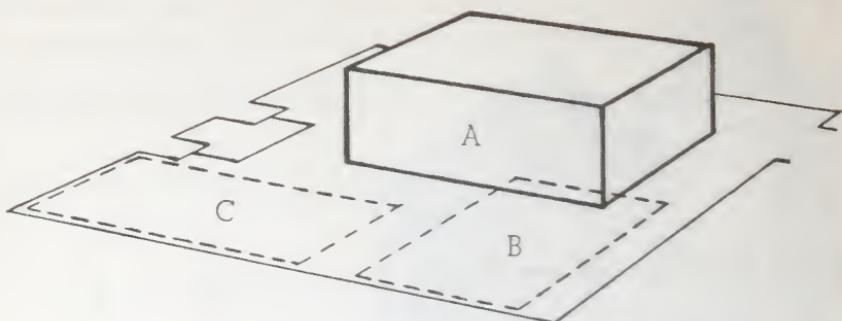


ILLUSTRATION NO. 9. A diagram showing how to place an indoor shelter in a room. Position A, in the middle of the room is best. Position B, with one end against a wall, is not so good. Position C, in a corner should never be used.

Placing the shelter

It is important to be able to escape from any side of the shelter should the house collapse. Therefore a shelter having escapes on all four sides, capable



ILLUSTRATION NO. 10.

of being opened from inside, is desirable. The Government shelter fulfils these conditions. The shelter should be placed preferably in the middle of the room, or failing this, at least 2 ft. away from any wall. If this is very

inconvenient, place one end of the shelter against a wall, both sides and the other end being left free. This wall should be a party wall, or other solid inside wall ; it should not be an outside wall or thin partition. On no account should the shelter be placed in a corner, leaving escape possible only from two of the four sides.

The illustrations on Page 12 show a table shelter properly placed in a refuge room.

Other forms of indoor shelter you can buy

Several types of indoor shelter, intended to give much the same protection as the Government "table" shelter, are now being marketed. The Ministry of Home Security is testing these, on application from the manufacturers.

*It is unwise to buy an indoor shelter for which the makers cannot produce a certificate of approval issued by the Ministry of Home Security.**

* Persons seeking official approval of their design for an indoor anti-débris shelter should write to the Chief Adviser, Research and Experiments Department, Ministry of Home Security, Forest Products Research Laboratory, Princes Risborough, Aylesbury, Bucks, for an application form. A bulletin entitled "Notes on the Indoor Anti-Débris Shelters," intended for designers of indoor shelters, can also be obtained, free of charge, from the Research and Experiments Department on application by letter.

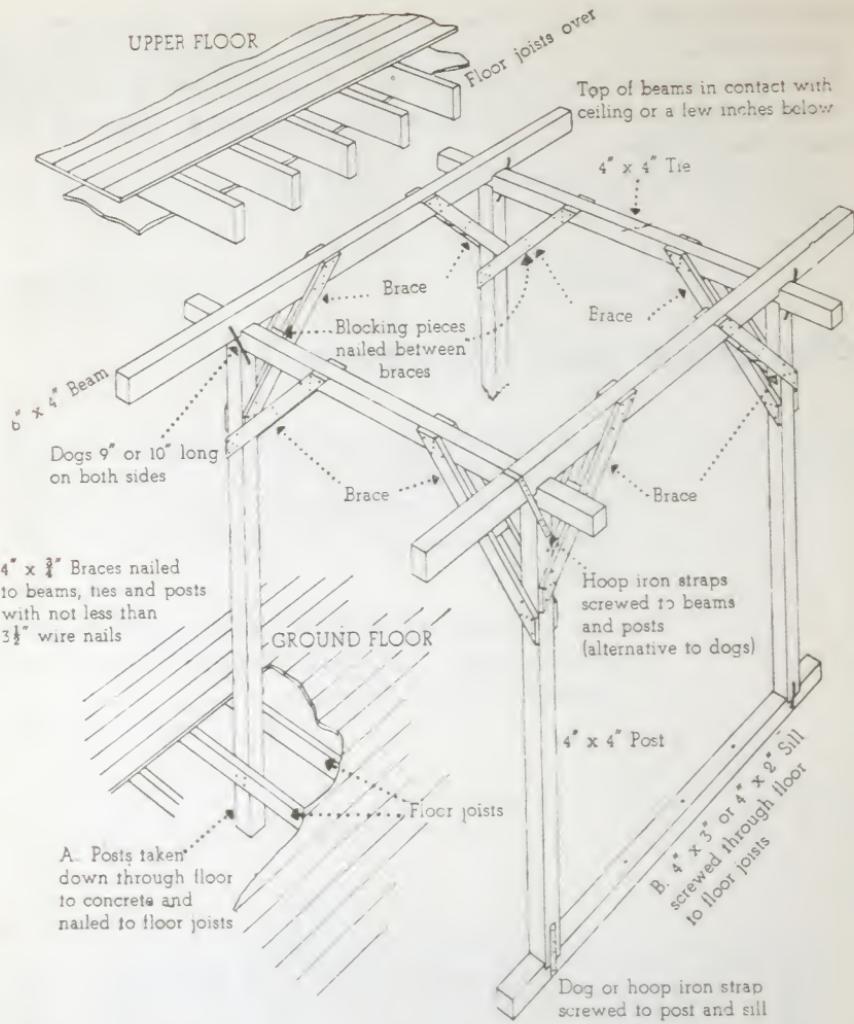


ILLUSTRATION NO. 11. Independent timber framework for a refuge room. If the posts are more than 6 ft. 6 in. apart, 8 in. x 4 in. beams are desirable.

A home-made shelter

You will have noticed earlier in this booklet the statement that people have often been rescued from demolished houses because they had taken shelter under an ordinary table. This was because the table had by chance been strong enough to bear the weight of the falling bedroom floor. A timber framework can be built inside a refuge room to do the same thing, but with certainty. ILLUSTRATION NO. 11 shows a completed framework in squared

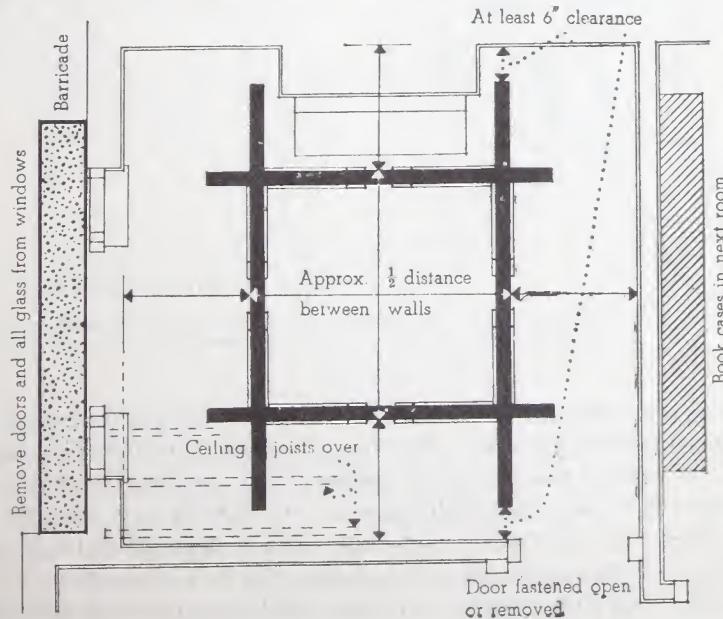
timber. ILLUSTRATIONS NOS 12 and 13 show how it goes into a refuge room. As, however, squared timber is more difficult to get, the use of round poles, as shown in ILLUSTRATION NO. 14, is specially recommended. (Poles of larch and Scotch fir can be obtained fairly easily in many districts.) ILLUSTRATION NO. 15 shows how this is put together. A refuge room with a framework of this kind to hold up the floor, and a properly barricaded window, gives a high degree of safety. It is best to sleep in the middle of the room under the framework, as there is less chance of your being hurt if parts of the wall fall inwards, though walls more often subside or fall outwards.

The framework is quite different in principle from propping up a floor. When a floor falls it gives a sideways push which is likely to knock props over. The framework is specially designed to be self-supporting and to withstand



ILLUSTRATION NO. 13.

Plan of a typical refuge room with an independent timber framework.
The room is the same as the dining room in Illustration No. 1.



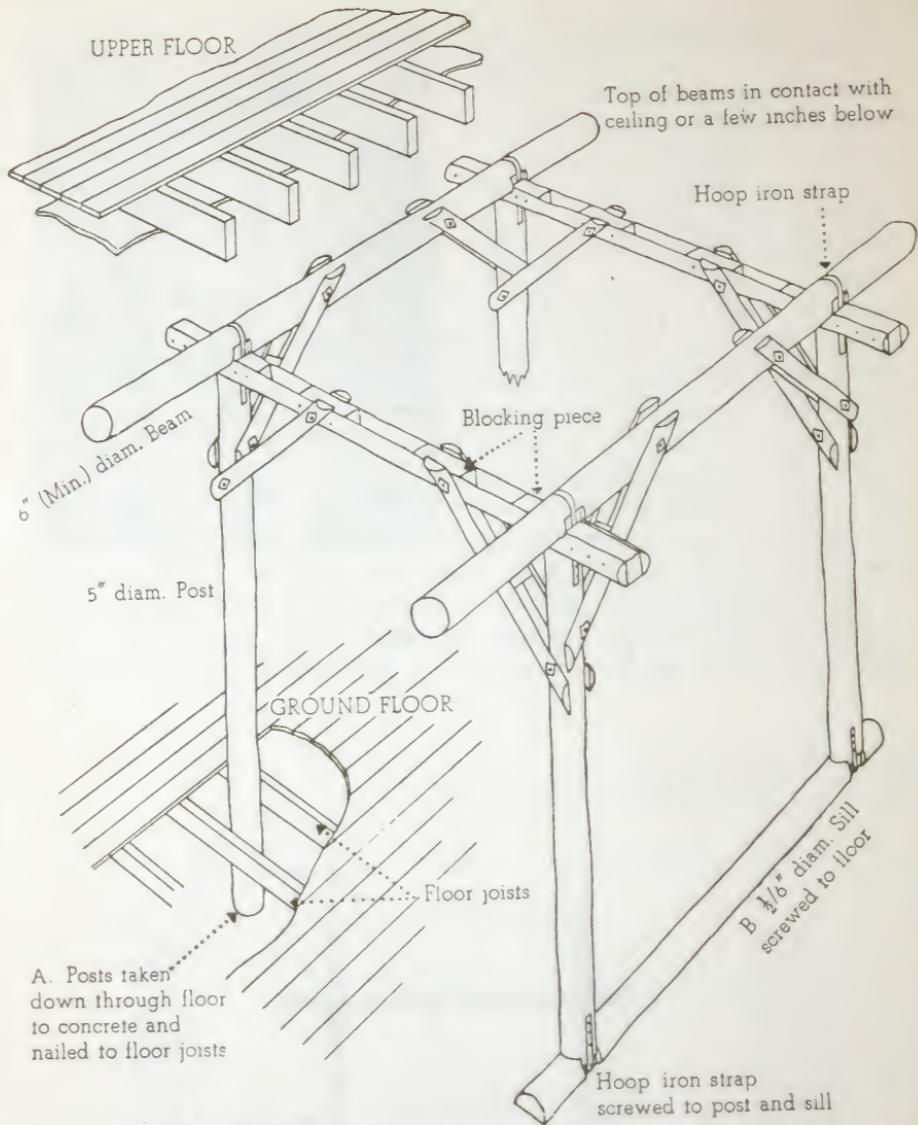


ILLUSTRATION NO. 14. Alternative construction of timber framework to that shown in Illustration No. 11. Round poles are used instead of squared timber.

this. You can make the framework in several ways, so long as the general principles given here are followed. The dimensions should be such that the posts stand at a distance from the walls approximately one quarter of the width or length of the room ; thus, if the room is 10 ft. wide by 12 ft. long, the posts will be about 2 ft. 6 in. from the side walls and 3 ft. from the end walls. The dimensions can be varied a little if necessary, but do not overdo it.

The posts may either be passed through small openings in the floor boards

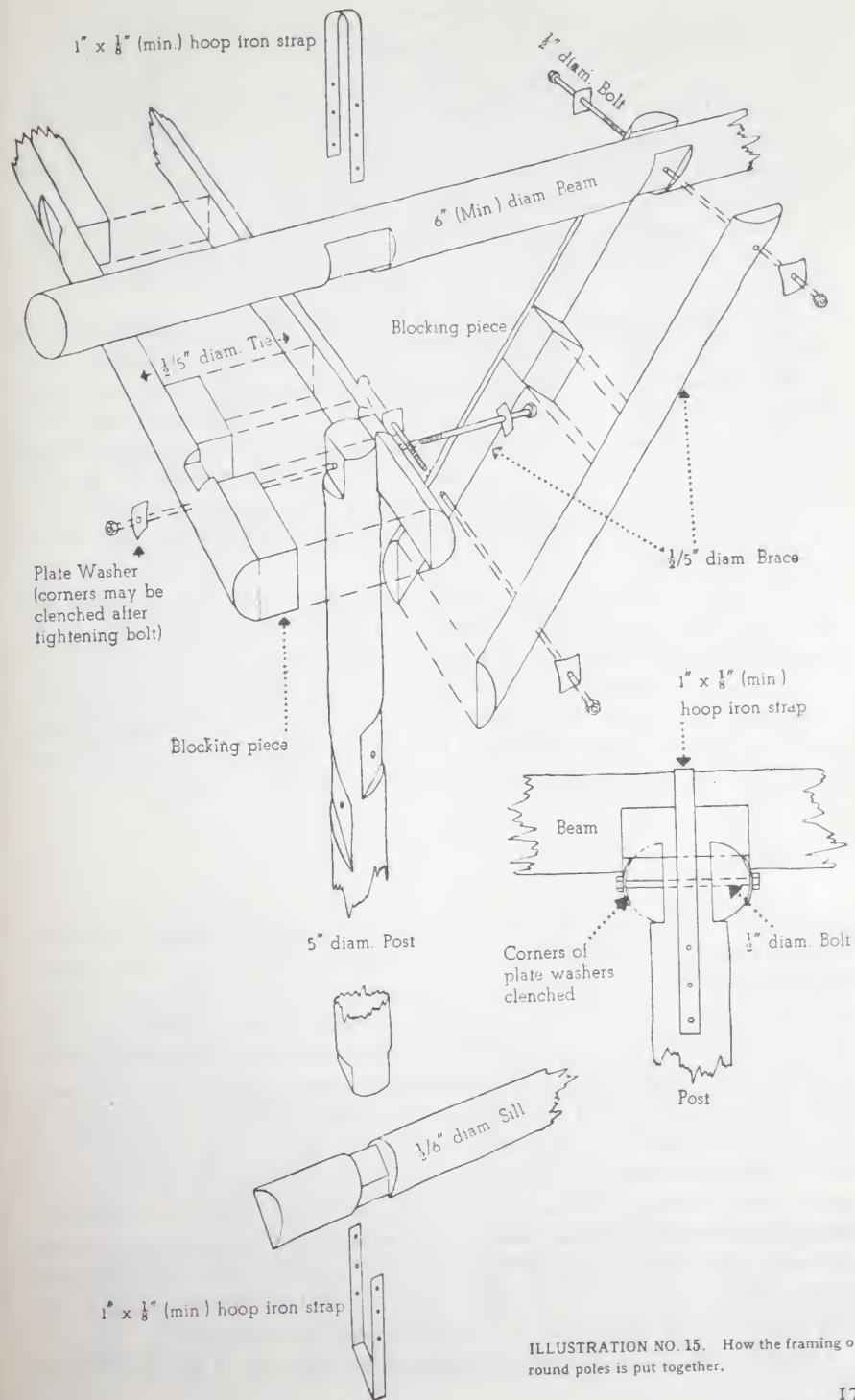


ILLUSTRATION NO. 15. How the framing of round poles is put together.

to bear on the solid concrete below, or fixed to a beam or heavy plank screwed to the floor, as shown in ILLUSTRATION NO. 11. If the space under the floor is deeper than 18 in. the posts must extend down to the concrete. The two highest beams of the framework must be placed at right angles to the ceiling joists ; their ends should not be nearer to the walls than about 6 in., so as to be safe from the chance of being struck heavily by the wall should it collapse. You can tell which way the ceiling joists run by observing the line of nails in the floor boards in the room above. The beams of the framework need not touch the ceiling, but they should not be more than 2 or 3 in. below.

Falls of ceiling plaster seldom cause serious injuries, but plaster can be brought down by blast, even if the walls and floors are not damaged. It is a simple matter to catch the pieces of plaster by fixing a layer of wire netting, fishing net, or something similar, over the top of the framework, and fixing it to the walls all round the room. Dust sheets, paper, etc., spread over the netting will prevent most of the smaller pieces coming through the netting. If you cannot get a strong netting, a canopy can be arranged by means of a dust sheet or bed sheet, supported on cords stretched tight from wall to wall over the framework.

The construction of the framework is a straightforward job, involving not much more than a saw, hammer and nails. The amateur carpenter or handyman should be able to do it with someone to help him put up the framework in the room. As none of the pieces of wood is as long as the dimension of the room along which it is to be placed, there should be no difficulty in getting everything into the room. Any local builder or carpenter would be able to do the job in a day or two, using the illustrations as working drawings.

Material

As rough timbers in 5 in. to 6 in. diameters are not much in demand, persons requiring material for A.R.P. purposes should not, as a rule, experience difficulty in obtaining the necessary permit from the Ministry of Supply, Timber Control Department, for the purchase of small quantities. The same applies to "limbs" in home-grown hardwoods, which are also available in many areas. The Timber Control Orders permit a purchaser to buy up to 20s. worth of timber per calendar month without a licence. Amounts in excess of this require a licence, which can be obtained from the Timber Control Area Officer.

ILLUSTRATION NO. 18. The house on the right had a timber framework in the front sitting room. The framework has slightly twisted but held up the debris. The house on the left has no framework and has collapsed. This was an experiment similar to that in Illustration No. 8.

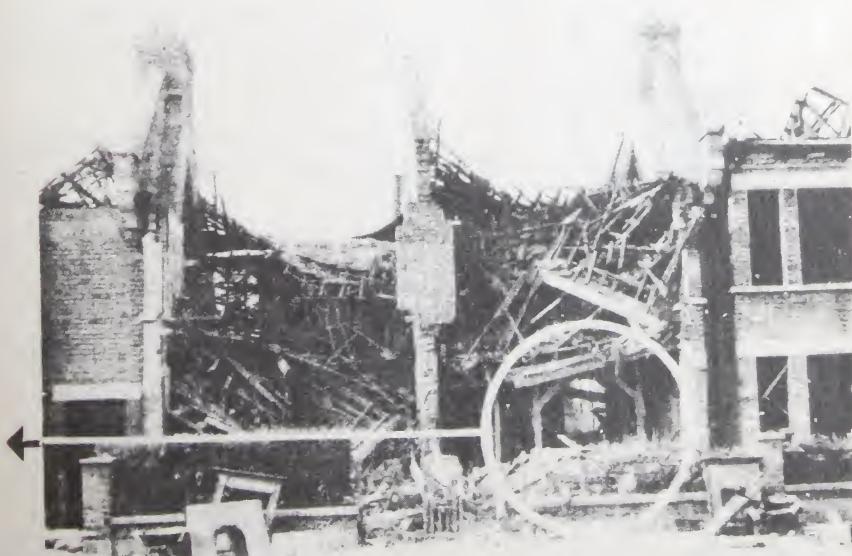
As there are only about 12 cu. ft. of timber in a ceiling support as shown in ILLUSTRATION NO.11, suitable for a room measuring up to 12 ft. by 12 ft. by 9 ft. high, it should not be a difficult matter for anyone to obtain the small quantity of green timber required, especially if a tree, or part of one, is purchased before it is felled, so as to obtain as much timber as possible within the 20s. limit. Alternatively, it is possible to obtain from some Local Authorities timber of suitable sizes salvaged from bombed houses.

Obtained in the ordinary way, the timber for a single framework costs about £4; to this must be added the cost of transporting it to your house. The same amount of salvaged timber should cost from £1 to £3, but will probably need cutting to the right sizes; transport costs will be extra to this.

How to obtain skilled advice

For a fee of half a guinea, a consultant appointed by one of the professional institutions of architects, engineers or surveyors will inspect your house and give you a written report stating the best room for a refuge in your house and describing ways within your means by which the protection it gives can be improved. If you want the services of such a consultant ask your Local Authority to show you a list of consultants from which you can choose. If your local council has no such list, you can apply for information to the

Secretary, Central Board of Advisory Panel of Professional Consultants,
1-7 Great George Street,
Westminster,
London, S.W.1.



ALWAYS HAVE YOUR GAS MASK
WITH YOU — DAY AND NIGHT
LEARN TO PUT IT ON QUICKLY

PRACTISE PUTTING ON YOUR GAS MASK



1. Hold your breath.
(To breathe in gas may be fatal.)
2. Hold mask in front of face, thumbs inside straps.
3. Thrust chin well forward into mask. Pull straps as far over head as they will go.
4. Run finger round face-piece taking care head-straps are not twisted.

MAKE SURE IT FITS

See that the rubber fits snugly at sides of jaw and under chin. The head-straps should be adjusted to hold the mask firmly. To test for fit, hold a piece of paper to end of mask and breathe in. The paper should stick.



Arrows indicate points needing particular attention.

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